

## **1.0 EXECUTIVE SUMMARY**

### **1.1 Introduction**

The City of Rogers selected Progressive Consulting Engineers, Inc. (PCE) to prepare a Comprehensive Water System Plan Update. The purpose of the study is to address the needs of the City water supply in the areas of water storage, treatment, and distribution. Necessary system modifications are recommended in a Capital Improvement Plan (CIP). Well water quality parameters were evaluated and the City's water distribution system modeled in existing and future states with the WaterCAD computer program.

### **1.2 Population**

The City estimates the population of Rogers to be 6,716 at the end of 2005 and projects an increase to 11,255 in 2015. This is an increase of about 68 percent over 10 years. These population projections are based on the planned development expected to occur within the current city limits and planned annexation area for 2010.

The City of Rogers also expects to annex significant areas of Hassan Township, which surrounds Rogers, by the year 2015. Expected annexation areas include over 1,000 acres southeast of current city limits, over 800 acres west of Willandale Road and south of Territorial Road, and over 1,100 acres north of current city limits. These areas are shown on the Appendix A map by S.E.H. entitled "Developable Land in Hassan Township". The north annexation area is already mostly developed with large lot residential, which has their own private water supply systems. This area is not expected to connect to the Rogers water system until 2015-2030 during reconstruction projects. The other annexation areas are projected to fully develop with new developments by 2015. The population in 2015 is expected by the City of Rogers to be close to the ultimate population inside the projected 2030 city boundary. Southwestern Hassan Township may develop in the future, but this area would not be included in the Rogers water system.

The total Rogers population including the annexed Hassan Township areas is projected as 26,964 in year 2015, including a projected 15,709 people from new development in Hassan annexation. This is an increase of about 300 percent over 10 years. Of this total population, the population served by the water distribution system, or serviced population, is projected as 23,787 in year 2015 and 27,396 in 2030.

### **1.3 Water Use**

Design flows were estimated for the years 2006, 2015, and 2030 based on projected City development and historic and projected unit water use. Design flows are shown without and with the projected demands from the expected Hassan Township annexation areas. Based on the projected development and developable land map provided by S.E.H. and the demand projections for southeast Hassan provided by Schoell Madson, it is projected that Hassan Township will require a total of 1.927 million gallons per day (MGD) by 2015, and 2.331 MGD

by 2030. This will require City to install wells and water mains to produce and distribute water to meet this additional demand.

Per capita residential use has averaged roughly 130 gpcd of water pumped. A Maximum Day/Average Day ratio of 3.3 is expected in the future. It has been assumed that the effects of conservation measures and legislation on water use practices will prevent any sustained exceedance of this average per capita residential water use and maximum day demand factor.

Projected City demands, or design flows (in million gallons pumped per day), are as follows:

Without Hassan	Ave Day (MGD)	Max Day (MGD)	Max Hour (MGD)
2006	1.442	4.760	9.520
2015	2.355	7.770	15.540
2030	2.461	8.123	16.246

With Hassan	Ave Day (MGD)	Max Day (MGD)	Max Hour (MGD)
2006	1.442	4.760	9.520
2015	4.282	14.130	28.261
2030	4.792	15.814	31.628

## 1.4 Existing System

The existing water system is shown on Insert A, and consists of six confined aquifer wells and two water towers. Wells 3, 4, 5 and 7 are located near County Road 81 and Rogers Memorial Drive, while Wells 6 and 8 are located by Rogers High School. Well 8 is under construction during spring 2007 and has a design capacity of 1,000 gpm. At present, the City wells have a combined capacity of 4,800 gallons per minute (gpm) or 6.912 million gallons per day (MGD) that will increase to 5,800 gpm (8.352 MGD) by spring 2007. The firm well capacity (capacity with the largest well out of service) after Well 8 is constructed will be 4,800 gpm (6.912 MGD). Wells 3, 4, 5, and 7 are run in rotation in the winter low-demand season, while Well 6 is locked out except when needed in summer due to high levels of iron and manganese. The City has two storage facilities: the 400,000-gallon East Tower and the 750,000-gallon West Tower. A high-pressure zone exists at the higher elevation in the southern part of the City. A booster station consisting of two 500-gpm capacity booster pumps and a 100-gpm capacity jockey pump serves the high-pressure zone. As of recently, the jockey pump is used only as a backup pump.

## 1.5 Safe Drinking Water Act (SDWA) Impact

The Minnesota Department of Health periodically tests City drinking water for various organic, inorganic, and microbiological contaminants that are regulated by the U.S. Environmental Protection Agency. Test results showed that the water supply meets all primary standards. Primary standards are those related to health. The results identified areas where more complete treatment of the water may be necessary to meet acceptable contaminant levels. The most significant problem identified in the City system is the relatively high concentrations of iron and

manganese, which is not a human health concern but may cause nuisance problems in the distribution system if not adequately treated.

## **1.6 Water Treatment**

Two methods of treatment to control iron and manganese in drinking water are (1) sequestering and (2) removal by filtration. In the sequestering process phosphate compounds are added to the water to prevent the iron and manganese from precipitating. Sequestering loses its effectiveness with high contaminant levels, time, and temperature. A more desirable solution is the removal process whereby the iron and manganese are oxidized, precipitated, and filtered out.

To reduce the levels of iron and manganese from the wells, water treatment by filtration is recommended for evaluation. If water treatment is approved, PCE recommends a south water treatment plant by the existing well field located near County Road 81 and Rogers Memorial Drive and a north water treatment plant by the existing well field located near Rogers High School. These two plants should be designed to treat the water from all existing and proposed wells.

## **1.7 Distribution System**

Updated models using WaterCAD computer software were used to analyze the existing and projected distribution systems for conditions of peak customer demands and fire demands. The existing distribution system adequately meets the present needs in most parts of the city. Pressures are adequate throughout the system at all operating conditions. However, the existing distribution system is unable to meet fire flow demand requirements during Maximum Day conditions (or even Average Day conditions) in the residences on Ahlstrom Road (west from Main Street), commercial/ industrial areas east of the intersection of I-94 and TH 101 including the Union 76 station, and the majority of the high-pressure zone at the south edge of the city.

The high-pressure zone has inadequate fire protection for an extended period of time due to the combination of the following: only a single connection point connecting the zone through the booster station to the rest of the water system (the normal-pressure zone), an undersized main downstream of the booster station to serve the high-pressure zone, and the lack of supply wells or water storage in the high-pressure zone. Dead ends and undersized mains are causing the other insufficient areas throughout town to have inadequate fire protection for an extended period of time.

Recommended future watermain additions (see Insert B and the attached CIP) are given for the purpose of improving water circulation and supply in the water system, to maintain optimal water surface elevations in the towers, and to serve areas of future development with City water.

Rogers expects to annex large portions of Hassan Township and connect the areas to the Rogers water distribution system. Annexed land in the southeast, south, and west is planned to be connected to the water system as it develops up to year 2015. Existing development north of Rogers would be connected to the water system during reconstruction between 2015 and 2030.

## **1.8 Production**

The City water source consists of five wells that draw water from the Franconia-Ironton-Galesville (or FIG) aquifer, with a total capacity of 4,800 gpm. One new FIG well of 1,000 gpm is under construction, which will increase the total capacity to 5,800 gpm in 2007. The well capacity must be able to supply the required water to the growing population during peak demand conditions.

Increased Rogers demands including annexed Hassan Township projected water demands would require six additional 1000-gpm wells before year 2015 and one more before 2030. In comparison, increased demands only within the current city limits and the current 2010 planned annexation areas would require one additional 1,000-gpm well before 2015.

Plans for the proposed wells are listed in the attached CIP. It will also be imperative to replace any wells taken out of service with new wells.

## **1.9 Storage**

The existing storage includes the 400,000-gallon East Tower and the 750,000-gallon West Tower. A new 1 MG water tower is planned for 2008 in the high-pressure zone at the south edge of Rogers. This tower will increase the reliability and fire flow capacity of the high-pressure zone, which now relies only on the existing booster station to supply water. This tower will serve the expanding high-pressure zone in the higher elevation areas in the southern part of the City, but should also include the ability to provide water back to the normal-pressure zone during peak demand conditions.

In order to fulfill the growing demand of the City population including the demand of the annexed Hassan Township area, the City will approximately require an additional 2.5 MG of storage (after the 1 MG high-pressure tower) by year 2015 and another 0.6 MG of storage by 2030.

PCE recommends building the additional storage in the normal-pressure zone and building as few facilities as possible to minimize costs. City staff is interested in ground storage over elevated storage due to space and cost concerns. Therefore, PCE recommends the construction of a 2 MG ground storage reservoir in conjunction with each of the proposed water treatment plants.

## **1.10 Recommendations**

The recommended capital improvements are shown on the Water Distribution System Maps – 2015 (Insert B) and 2030 (Insert C) and listed in detail in Table 8-1. Also listed in the CIP are the estimated costs of the capital improvements in terms of the value of dollars in year 2007. Recommended improvements include new wells, water storage facilities, treatment facilities, and new and reconstructed watermains to accommodate City growth and improve water system adequacy. Recommended improvements are estimated to cost \$39.3 million between 2007 and 2015 and \$3.6 million between 2016 and 2030.